

Veröffentlichung im Amtsblatt	Ja/Nein
Publication in the Official Journal	Yes/No
Publication au Journal Officiel	Oui/Non

Aktenzeichen / Case Number / N^o du recours : T 28/88 - 3.4.1

Anmeldenummer / Filing No / N^o de la demande : 81 305 539.9

Veröffentlichungs-Nr. / Publication No / N^o de la publication : 0 053 888

Bezeichnung der Erfindung: Electrostatic toner composition
Title of invention:
Titre de l'invention :

Klassifikation / Classification / Classement : G03G 9/08

ENTSCHEIDUNG / DECISION
vom / of / du 27 November 1989

Anmelder / Applicant / Demandeur : Xerox Corporation

Patentinhaber / Proprietor of the patent /
Titulaire du brevet :

Einsprechender / Opponent / Opposant :

Stichwort / Headword / Référence :

EPO / EPC / CBE Article 56

Schlagwort / Keyword / Mot clé : "Inventive step (denied)"

Leitsatz / Headnote / Sommaire

Europäisches
Patentamt

Beschwerdekammern

European Patent
Office

Boards of Appeal

Office européen
des brevets

Chambres de recours



Case Number : T 28/88 - 3.4.1

D E C I S I O N
of the Technical Board of Appeal 3.4.1
of 27 November 1989

Appellant : Xerox Corporation
Xerox Square 020
Rochester
New York 14644 (US)

Representative : Goode, Ian Roy
c/o Rank Xerox Patent Department
338 Euston Road
London NW1 3BH (GB)

Decision under appeal : Decision of Examining Division 044
of the European Patent Office
dated 10 August 1987 refusing
European patent application
No. 81 305 539.9 pursuant to
Article 97(1) EPC

Composition of the Board :

Chairman : K. Lederer
Members : C. Black
C. Payraudeau

Summary of Facts and Submissions.

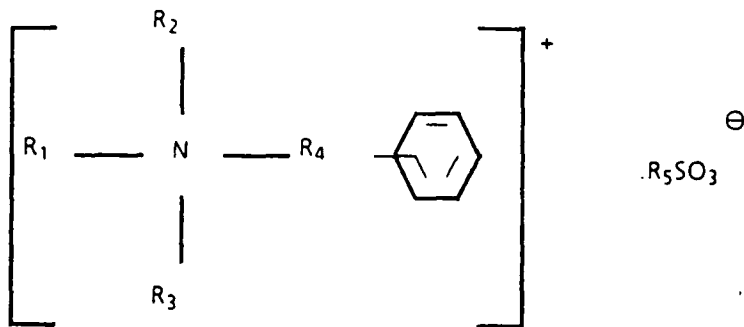
- I. European patent application No. 81 305 539.9 (publication No. 0 053 888) was refused by decision of the Examining Division.
- II. The decision was based on claims 1 to 8 as originally filed, with claims 1 and 8 amended as proposed in the Applicant's communication of 25 January 1985 (received 28 January 1985).

The reason for the refusal was that the subject-matter of the claims did not involve an inventive step having regard to the disclosures in Product Licensing Index, August 1972, No. 100, pages 54 to 56, Article No. 10020 (hereinafter PLI) and Research Disclosure 140 (December 1975) pages 6 to 8, Article No. 14017 (hereinafter RD).

- III. An appeal was lodged against this decision.
- IV. In the course of an exchange of communications with the Appellant, the Board referred additionally to US-A-3 893 935 and US-A-3 944 493 and to data sheets relating to Stearyl Dimethyl Benzyl Ammonium Chloride. These documents are listed on the front page of US-A-4 394 430 which was published after the priority date of the application in suit and the attention of the Examining Division had been drawn to them by the Appellant (applicant) as being further prior art of possible relevance (communication of 25 January 1985).
- V. The Appellant now requests in effect that the decision under appeal be set aside and that a patent be granted on the basis of revised claims reading as follows:

Main request

Claim 1. A dry electrostatic toner composition including a resin, a pigment, and a charge control agent, characterised in that the charge control agent is dispersed therein and comprises from 0.1 to 10 percent based on the weight of toner of an organic sulfonate compound which is compatible with a fuser roll surface comprising a copolymer of vinylidene fluoride and hexafluoropropylene, the charge control agent being of the following formula:



wherein R₁ is an alkyl radical containing from 12 to 22 carbon atoms, R₂ and R₃ are independently selected from alkyl groups containing from 1 to 5 carbon atoms, R₄ is an alkylene group containing from 1 to 5 carbon atoms, R₅ is a tolyl group.

Claim 3. A dry electrostatic toner composition including a resin, a pigment, and a charge control agent, characterised in that the charge control agent is dispersed therein and comprises from 0.1 to 10 percent based on the weight of toner of stearyl dimethyl phenethyl ammonium methyl sulfate.

Claim 5. A developer composition for use in electrostatic imaging systems, comprising a carrier material and a toner composition according to any one of claims 1 to 4.

Claim 8. A method of imaging comprising forming a negative electrostatic latent image on a photoreceptor, contacting the image with a developer composition comprising a positively charged dry electrostatic toner composition and a carrier, the developer composition being in accordance with any one of claims 5 to 7, subsequently transferring the developed latent image to a substrate, and permanently affixing the image thereto by means of a soft roll fuser having a surface comprising a copolymer of vinylidene fluoride and hexafluoropropylene.

Claims 2 and 4, and claims 6 and 7 are dependent on claims 1 and 5 respectively and relate to particular embodiments of the toner and developer composition of these claims.

First auxiliary request:

Claim 1 of main request, wherein R_1 contains 14 to 18 carbon atoms, R_2 and R_3 from 1 to 3 carbon atoms and R_4 1 or 2 carbon atoms.

Second auxiliary request:

As first auxiliary request, wherein R_1 contains 16 or 18 carbon atoms.

This interpretation of the Appellant's requests is in accordance with the content of the final paragraph of the communication of 26 May 1989 (received 30 May 1989).

VI. The Appellant argues essentially as follows.

PLI and RD each define charge control agents in terms of a generic formula which covers a very large number of compounds. Neither is concerned with the problem of compatibility of charge control agents with a fuser roll surface comprising a copolymer of vinylidene fluoride and hexa-

fluoropropylene, therefore contains no indication of how to choose specific substituent radicals or anions so as to achieve this compatibility. The generic formula for the charge control agent in PLI does not include toluene sulphonate as an anion and the specific examples only have chloride and bromide as anions so that there is no hint here to the anion now required by claim 1. Further, although the generic formula embraces a benzyl radical in the quaternary ammonium ion, the specific examples do not contain this radical so that again there is no hint as to the necessary presence of a phenyl alkyl radical as in claim 1. The definition of the charge control agent by the said generic formula therefore is seen as involving unsubstantiated generalisations.

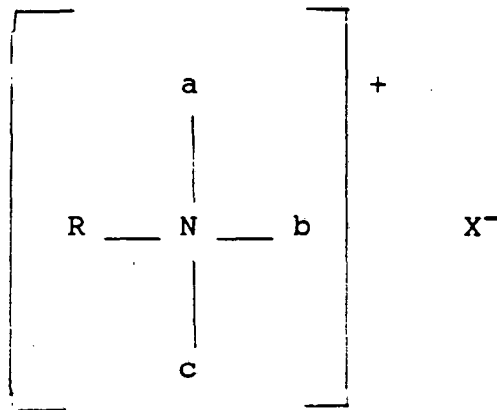
As regards claim 3 the generic formula in PLI does not embrace the phenethyl radical. In this respect it is noted that in this field, apparently small changes in compounds (such as between phenethyl and benzyl) can have significant and unpredictable effects.

Further PLI discloses that the charge control agent is present only on the surface of the toner particles, whereas the claims require that it is dispersed in the toner particles. In this respect PLI points away from the invention. It is therefore only with hindsight that the disclosure in PLI could lead to the subject-matter of claims 1 and 3.

The only long chain radical disclosed in RD contains an amido linkage, so that RD must be primarily read as being directed to a charge control agent containing such a radical and therefore different from that of the application in suit. Moreover RD indicates that concentration of the agent at the surface of the toner particles is preferred, therefore confirming the teaching of PLI.

Reasons for the Decision

1. The appeal is admissible.
2. The closest prior art in the Board's view is the disclosure in PLI. This discloses a dry electrostatic toner composition largely meeting the requirements of claims 1 and 3, and including a charge control agent having the formula:



wherein R is a straight-chain normal C₁₀ to C₂₂ radical, a, b and c are methyl, ethyl or benzyl (usually no more than one benzyl) and X is Cl, Br, methosulphate, ethosulphate or the like. The charge control agent as now defined in claim 1 differs from this mainly in that it requires the anion to be toluene sulphonate, that defined in claim 3 differs in that it requires a phenethyl group in the quaternary ammonium ion. Neither of these possibilities are embraced by the above generic formula, therefore the subject-matter of claims 1 and 3 is novel.

3. When this closest prior art is taken into account, the problem underlying the application in suit can be seen to be the provision of toner particles having a different, possibly improved, charge control agent. Since it is a normal task of the average skilled to seek alternatives to

known substances, measures etc., recognition of this problem does not contribute to inventive step.

4. The differences between the subject-matter of claims 1 and 3 which have to be considered in assessing inventive step will be dealt with individually.
5. The difference between C₁₂ to C₂₂ alkyl, as in claim 1, and C₁₀ to C₂₂ straight chain normal (i.e. alkyl) radical can be discounted as being of no significance, the choice of a lower limit of chain length for sufficient hydrophobicity being largely arbitrary.
6. The subject-matter of claim 1 further differs from the disclosure in PLI in that one benzyl group is essential as opposed to optional. In this respect, the skilled person, to arrive at the subject-matter of claim 1 has to choose three possibilities from seven. Now PLI states that conventional surfactants are effective cationic agents (for charge control) and include quaternary ammonium compounds many of which have the generic formula (see paragraph 2) given on page 55, left column. One such surfactant, known before the priority date of the application in suit, is stearyl dimethyl benzyl ammonium chloride. This is not disputed, the applicant himself having drawn the attention of the Examining Division to further prior art of possible relevance listed on the front page of the later published US-A-4 394 430 (see paragraph IV above). According to this, the said compound was known in January 1975. Therefore, at the priority date of the application in suit, the skilled person had a clear indication to choose benzyl as one of the radicals a, b and c from a limited number of possibilities, the remaining two being methyl and/or ethyl.

7. Claim 1 includes, in addition to benzyl, the possibility that R₄ is C₂ to C₅ alkylene, of which only C₂ alkylene (in the phenethyl radical) is disclosed. The Appellant has not shown that this has any effect different from that of benzyl, which might be an indication of the existence of inventive step.

8. Claim 1 under consideration also differs from PLI in that it now requires that the charge control agent is dispersed in the toner composition whereas in PLI it is concentrated at the surface. To this it is observed that PLI concerns particularly a method for the preparation of toner particles including a charge control agent having hydrophobic and hydrophilic moieties. It also identifies appropriate charge control agents. The features of the method result, it is postulated, in the hydrophobic moiety being embedded in a surface portion of the toner particle and the hydrophilic moiety being located at the surface, thus providing the positive charge where it is required. However, for the average skilled person, incorporation of the charge control agent by dispersing it in the toner material was also known at the priority date of the application - see e.g. the references to spray-drying and melt-blending in US-A-3 893 935, column 4, line 59 to column 5, line 29 and US-A-3 944 493, column 6, line 49 to column 7, line 19. (These documents are among those drawn to the Examining Division's attention by the applicant - see paragraph IV above). Further, the Research Disclosure article (RD) states on page 7, left column:

"The charge agents of the disclosure tend to provide best results when the concentration of the charge agent within an individual toner particle is greater at or near the surface of the particle than it is within the interior of the particle. Of course, useful results can also be obtained in accord with the present disclosure when the

charge agents described herein are distributed in a uniform manner throughout the toner particle composition."

Accordingly whether the charge control agent is distributed uniformly throughout or at the surface of the toner particles would seem to be options which the average skilled person can choose according to his requirements. No inventive step is seen in reverting to a known, simpler process, and neither RD nor PLI can be seen as teaching away from the subject-matter claimed in this respect.

9. As regards the anion portion, PLI discloses Cl, Br, metho- sulphate (methyl sulphate) ethosulphate (ethyl sulphate), or the like. In three specific examples, only chloride and bromide are disclosed. However, it does not follow, as argued by the Appellant, that the organic sulphates also embraced by the generic formula represent only an unsubstantiated broadening statement. There is a clear teaching that these are alternatives to the halides and in interpreting "or the like" at the priority date of the application the skilled person would be aware of and be guided by the teaching of RD which discloses as anion in a quaternary ammonium charge control agent alkyl sulphates and sulphonates such as methyl sulphate and methane sulphonate and aryl sulphonates such as p-toluene sulphonate (page 7, right column). Moreover, page 7, left column, states that the properties of the charge agent are, in large part, attributable to the combined presence of one or more long chain alkyl or alkylene groups and the organosulphur-containing group. Accordingly, the restriction of the anion to toluene sulphonate as now set out in claim 1 does not appear to contribute to inventivity.

In citing RD, it is not being suggested that the cationic portion of the charge control agent required by claim 1 is obvious having regard to the cationic portion of the RD

charge control agent. RD firstly provides the general teaching that the charge control agent may be dispersed uniformly throughout the toner particles (as now required by claim 1) or concentrated at the surface. Secondly, it provides a list of suitable anions corresponding closely to, and largely overlapping, the list provided by PLI. RD's contribution to the pool of anions from which the average skilled person can choose is toluene sulphonate as now required by claim 1.

10. PLI further discloses that the proportion of charge control agent can be determined by routine experiment. It gives certain criteria for guidance in this respect and suggests 0.1 to 5 percent by weight of charge control agent in the toner particles. In comparison with this disclosure, the range of 0.1 to 10 percent by weight stated in claim 1 cannot be of inventive significance even where it lies outside the PLI range.

11. The subject-matter of independent claim 3 differs from the PLI disclosure in requiring a phenethyl group where PLI discloses benzyl, phenethyl differing from benzyl only in having one more methylene group. The Appellant has argued that in this field small changes in compounds can have very significant effects on properties, but this has not been substantiated, e.g. by a comparative test showing that a charge control agent with a phenethyl group in the quaternary ammonium ion had superior compatibility with fuser roller surfaces comprising a copolymer of vinylidene fluoride and hexafluoropropylene (see paragraph 12 below). Claim 3 also requires selection of stearyl (C₁₈) from the straight-chain C₁₀ to C₂₂ radicals disclosed in PLI. The stearyl radical is however common in surfactants (cf. the compound referred to in paragraph 6 above). The required anion, methyl sulphate, is one of those disclosed in PLI (as methosulphate) and no unexpected effect has been shown to arise from these selections.

12. The Appellant has argued also that neither PLI nor RD are concerned with the said compatibility of the charge control agents with fuser roll surfaces. It is not disputed by the Board that the examples in the application in suit demonstrate that the charge control agents required by the claims have this compatibility. What has not been shown is that the charge control agents as required by the claims have improved compatibility as compared with the nearest prior art (those disclosed in PLI) and that this improvement has its origin in the distinguishing features of the claims (cf. in this respect decision T 197/86, OJ EPO 1989, 371). The prior art acknowledged in the introductory part of the description is much more remote from the subject-matter of the application than the PLI disclosure. The Appellant has stated in his communication dated 21 July 1989 that to make such tests now more than eight years after the original work was done would require considerable time and effort, therefore he has been unable to do so. This may well be, but the fact remains that the alleged improvement has not been evidenced.

13. In summary the differences between the subject-matter of claims 1 and 3 and the PLI disclosure are, in the case of the cation portion, either trivial (the long chain alkyl group and the proportion of charge control agent), or represent a non-inventive selection from a limited number of possibilities (a, b and c are benzyl and two alkyls, i.e. methyl and/or ethyl) or involve next higher homologues of benzyl which have not been shown to have an effect different from benzyl. As regards the anion portion this results from an obvious combination of the teachings of PLI and RD. The Appellant's argument that the generic formula in PLI encompasses a very large number of compounds from which an inventive selection had to be made therefore cannot be followed.

14. Accordingly the subject-matter of claims 1 and 3 (main request) does not involve an inventive step. Therefore, the invention as claimed according to Appellant's main request does not meet the requirements of the EPC and, consequently, a patent cannot be granted (Art. 97 EPC).

15. The limitations contained in the first auxiliary request (alternative 1) do not introduce inventivity, C₁₆ alkyl being known from PLI and C₁₈ alkyl being an obvious choice which is moreover known from the references in paragraphs 6 and 11. R₂ and R₃ having 1 and 2 carbon atoms is known from PLI; for R₄ having 1 or 2 carbon atoms see paragraphs 5 and 7. The restriction of R₁ to C₁₆ or C₁₈ according to the second auxiliary request (alternative 2) is also known (see the foregoing in respect of alternative 1).

Therefore, the inventions as claimed in Appellant's 1st and 2nd auxiliary requests do not meet the requirements of the EPC either, and consequently a patent cannot be granted with such claims.

Order

For these reasons, it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

M. Beer

K. Lederer